Ford Motor Company
AERONUTRONIC DIVISION

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SPACE AND WEAPON SYSTEMS

TECHNICAL REPORT

FIFTEENTH BIMONTHLY TECHNICAL PROGRESS REPORT A LUNAR SEISMOMETER CAPSULE SUBSYSTEM FOR RANGER

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October 1962

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LUNAR SEISMOMETER CAPSULE SUBSYSTEM FOR RANGER

A. Constant

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1. SUMMARY

During this reporting period all engineering effort directed at improvement and modification of the lunar capsule system was completed. All projects were concluded successfully and all significant technical goals were achieved.

Surveillance firings on major ordnance items were completed, and predicted performance was verified. A significant squib switch failure after sterilization was discovered; major rework of partially assembled capsules was necessitated, and was accomplished without predictable compromise of reliability or serious delay in delivery.

All flight hardware was completed and delivered to AMR on schedule. Flight assembly and checkout operations were trouble-free, and were completed confortably within spacecraft schedule parameters. Modification of capsule installation techniques minimized potential RFI problems, and no significant difficulties were experienced.

2. ENGINEERING AND TEST EFFORT

a. Power and Sequencing Assembly

Fabrication and test of the power and sequencing assembly was completed during this reporting period. The power and sequencing assembly incorporated all of the engineering changes discussed in previous bi-monthly progress reports. The new power and sequencing assembly (less battery) is shown in Figure 1.

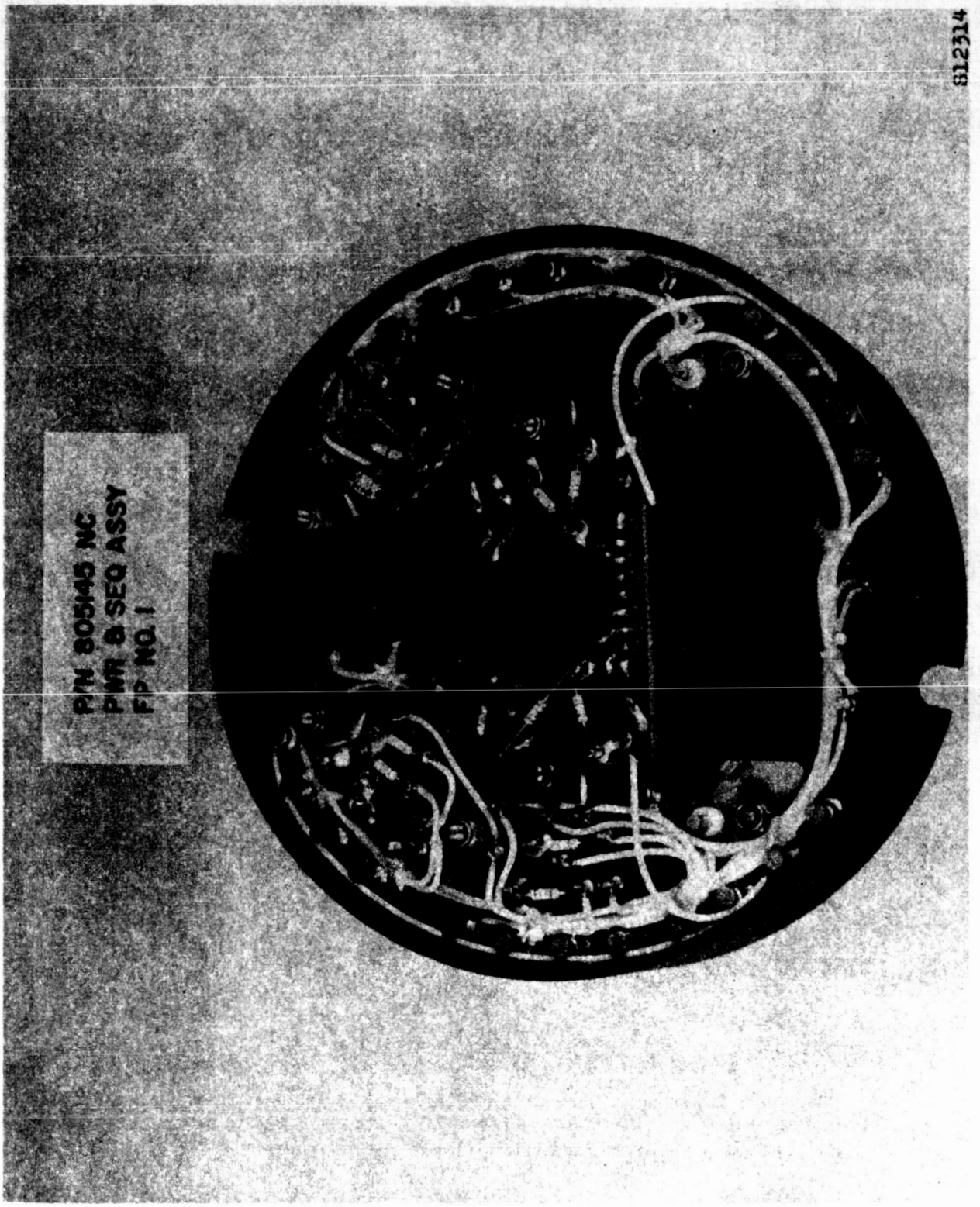

FIGURE 1. POWER AND SEQUENCING ASSEMBLY (LESS BATTERY)

During design proof testing of the power and sequencing assembly it was discovered that the sterilized squib switches did not function. Consequently the design was modified to incorporate unsterilized squib switches. As an additional precaution, the squib switch encapsulating compound, which cures at 185°F for 12 hours, was changed to a compound which cures at room temperature. The same squib switches are also used in the survival capsule. Modification of the capsule that resulted from the failure of these switches is discussed elsewhere in this report.

A second potential problem with the new power and sequencing assembly was the reliable functioning of the limiting resistors that are in series with the ordnance squibs. During test it was determined that the resistors used did not reliably open when connected to a dead short. As a consequence, special limiting resistors incorporating a calibrated length of ni-chrome wire were fabricated for this application. A lot of these special resistors were qualified prior to incorporation in the design proof test and flight power and sequencing assemblies. It was determined that the special resistors would fuze in 60 to 70 milliseconds when loaded with a dead short and that the fuze characteristics were within the system requirements. A more complete discussion of the performance and qualification test of these resistors is included in report SCPT-45.

With the modifications discussed above, the power and sequencing assembly passed all design proof test and performance requirements. No difficulties were experienced in either mechanical or electrical interfaces in system assembly.

b Retromotors

The retromotors to be used for the RA-5 flight were manufactured in November 1961. Performance data on which the flight parameters are based were obtained during qualification firings shortly after the motors were manufactured To determine the effects of the approximately nine months' aging that the motors have experienced, three retromotors were fired at the AEDC altitude facility, and the significant performance parameters rechecked. Final analysis of the resulting data has not been completed. From the quick-look data it appears that the mean performance level of the three motors differed from the previously established mean performance by 0.05 percent. Maximum deviation from the mean for these three motors was 0.13 percent. The squib characteristics and the total burn time were normal. These values are essentially within the measurement accuracy of the test setup used. It is concluded, therefore, that any effects of aging will not significantly affect the motor performance for the RA-5 flight, so the previously established performance parameters have been used.

On one of the motors tested a small crack appeared at the exit of the nozzle. No apparent effect on the motor performance was noted, although it appears that this crack resulted from a pinhole burn-through. The precise cause must await availability and study of the high-speed movies that were made during the test.

Prior to firing the retromotors, tests of the throat plug load-deflecting characteristics were conducted. The retromotor throat plugs are required to support the spin motor during the Ranger flight missions. Combined vibration loads and internal pressure loads at ambient vacuum may apply as much as 150 pounds' force to the plug. It is required that the spin-motor nozzle tubes remain seated in the retromotor nozzle during transit to preserve alignment.

Pull tests were performed by Hercules Powder Company 16 November 1961, to obtain data for determining assembly techniques. These data are shown in Figure 2. As a result of these tests, it was decided to "seat" the plugs for flight motors by application of 150 pounds' force at assembly to reduce deflection under flight loads.

To verify that aging had not deteriorated the load-carrying capability of these plugs, pull tests were performed on the four test motors at AEDC. Results of these tests are shown in Figure 3. Motors 205 and 201 had been "seated" with 150 pounds' preload, while motors 209-A and 103 were assembled prior to that requirement.

Comparison of the two figures indicates no significant degradation had occurred. The plugs in the flight motors for RA-5 are considered satisfactory for use.

c. Spin Motor

To check the aging characteristics of the spin motor assembly, a flight-type motor was stored for about 90 days before firing. This assembly consisted of the following:

Case S/N	L-60
Manifold S/N	L-110
Ignitor S/N	L-34
Assembly Date	5-14-62

The components and assembly procedures were in accordance with flight specifications in all respects, except that the manifold was rejected for out-of-tolerance spurious torque after cold-flow balancing. The motor was assembled at a relatively humidity of 50 percent--the upper limit of the specifications.

The motor was fired on 17 August 1962, after 72 hours at a vacuum of about 12 microns. The nozzle caps were removed for the vacuum soak. The motor was fired at atmospheric pressure; the data listed below were converted to vacuum for comparison with previous qualification test data.

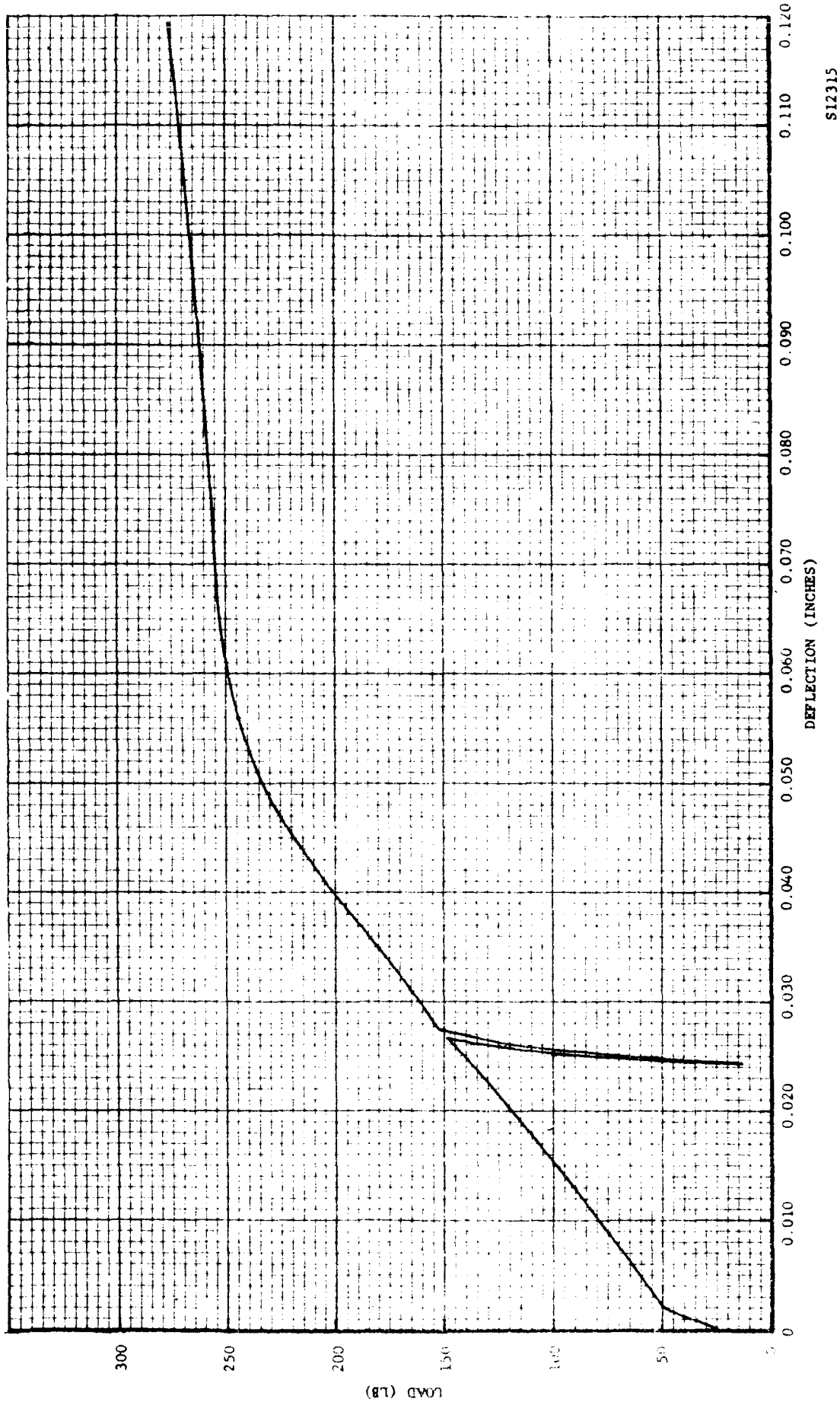

FIGURE 2. RETROMOTOR CLOSURE PLUG PULLOUT LOAD VERSUS DEFLECTION
(PRIOR TO INITIAL SEATING OF PLUG)

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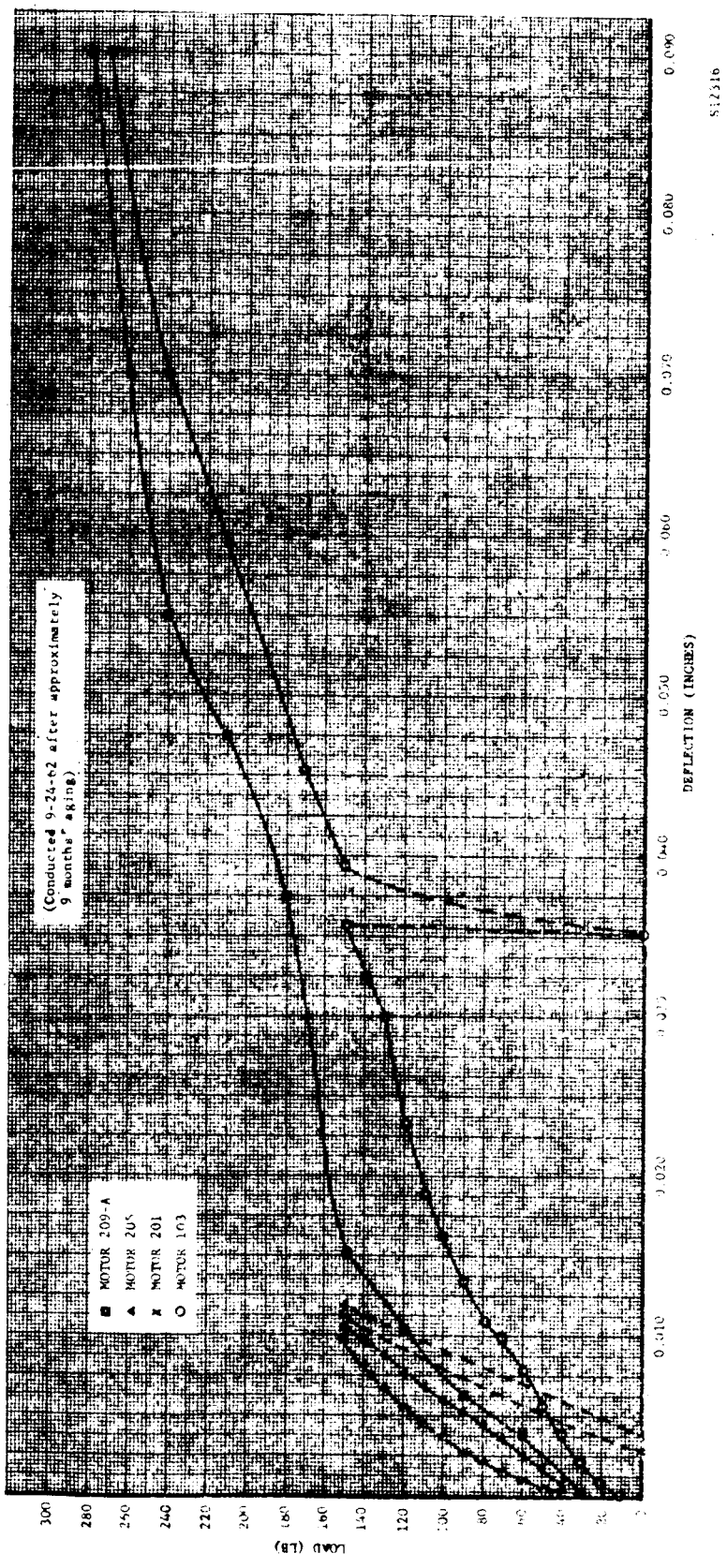

FIGURE 3. RETROMOTOR CLOSURE PLUG PULLOUT LOAD VERSUS DEFLECTION (SURVEILLANCE TESTS)

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PARAMETER	QUALIFICATION DATA MIN	MAX	AVG	SURVEILLANCE ROUND
Burn Time to 5 percent (sec)	1.10	1.19	1.14	1.10
Specific Impulse (sec)	204	210	208	210
Capsule Roll Rate	31.89	33.75	32.79	32.90

The ignition delay has not been tabulated as a line item, but it is consistent with previous firings.

In summary, the surveillance firing appeared completely typical in all respects.

d. Test of Sphere 015

The test and analysis of test data for sphere 015 have been completed. This test was primarily concerned with determining the thermal performance of the survival sphere. A complete report has been prepared on the results of this test, but the major results can be summarized here.

It may be noted that the nominal performance requirements of the survival sphere are based on landing in late lunar afternoon. For the test of sphere 015, landing during lunar night was simulated; this landing time simulation was requested by JPL and represents the most severe condition that can be imposed on the capsule insulation system. In total, then, the following conservative conditions existed during the thermal test:

(1) The floatation fluid was drained during simulated lunar night.

(2) The chamber temperature was held at a constant -250°F; the actual lunar night temperature varies quasi-parabolically from 0 to -250°F.

(3) The test was conducted at a pressure of about 1 micron; the pressure at the lunar surface is on the order of 10^{-12} micron.

The results of the test indicate that the capsule would not survive a lunar night under the conditions itemized above. The performance of the insulation was about one-third as good as previously established by sample tests under conditions more closely simulating those actually expected. This test did not confirm the previous results, so evaluation of performance in the actual environment is inconclusive at best, although it does appear marginal.

The water boiloff system operated as anticipated. The temperature held at a constant 85°F until the water supply was exhausted.

For a detailed discussion of the test results, refer to report SCPI-45.

3. STATUS OF FLIGHT HARDWARE

a. Capsule Assembly

Assembly of spheres 017 and 018 has been completed. These capsules were delivered to AMR on 15 and 16 September 1962 and were available to JPL for the RFI test on 20 September 1962. System performance of the capsules was normal in all respects.

The results of the RFI tests conducted at AMR were satisfactory. The transponder thresholds in the optimum capsule position are tabulated below.

CAPSULE	NORMAL TRANSPONDER THRESHOLD (dbm)	TRANSPONDER THRESHOLD WITH CAPSULE (dbm)	
		SHROUD OFF	SHROUD ON
017	-139	-137	-129
018	-139	-138	-132

On the basis of the RFI tests and Aeronutronic recommendations, sphere 018 was selected as the prime capsule for RA-5. The transponder threshold in the shroud on conditions for sphere 017 was -129 db--slightly less than the -130.4 db desired. It was decided by JPL personnel that this deviation was not serious, and sphere 017 was used as the backup capsule.

As previously noted, it was discovered during test of the power and sequencing assembly that the Atlas squib switches would not function after sterilization baking. At the time this was discovered, spheres 017 and 018 had been partially assembled and incorporated and sterilized squib switches. Assembly had proceeded past the installation of the insulation shell of both spheres. It was therefore necessary to remove the outer shell and insulation in order to replace the sterilized squib switch with unsterilized switches from the same lot.

The squib switch assembly is solidly encapsulated with 828 epoxy resin in one of the cavities in the upper structure. Although replacement of the squib switches appeared impossible, a technique for removing the encapsulating material was developed which allowed replacement of the entire module without detectable effect on the quality of the resulting assembly or functional reliability of the system. It was determined that the 828 resin softens at a temperature of about 180°F, which is well below the temperature at which insulation and other electronic components would be damaged. Heat was applied by a small hot-air gun, and temperature was monitored by a thermocouple in the air blast. As the encapsulating material softened, it was scraped away with a plastic stylus. By working very carefully, wire bundles that were freeze-coated over the squib module were freed, end connections unsoldered, and the defective module removed without significant damage to the surrounding components. After a squib module with unsterilized squibs was installed, each of the leads that had been disturbed rechecked both physically and electrically prior to reinstallation. The details of this inspection and any corrective action required are included in Tables 1 and 2.

A photograph of capsule 018 inner sphere assembly during rework is shown in Figure 4. At this stage the wiring is not freeze-coated and the battery terminals have not been re-encapsulated. All wires are the original ones, as can be noted by fragments of epoxy on the wires. Note that two of the wires have been sleeved because of minor nicks in the insulation that occurred during rework. The appearance of capsule 017 was similar.

As a result of this rework, approximately 40 more hours of running time were put on these capsules than experienced during a normal buildup. This does not significantly affect the total expected life of the capsule. During this rework an opportunity was afforded to check battery performance after about 60 hours of operation in the actual capsule. The battery charge condition corresponded very closely to the results expected from prior battery life tests.

TABLE 1

SUMMARY OF SPHERE 017 WIRE REWORK

WIRE NO.	CONDITION	DISPOSITION	TEST REQUIREMENTS
44	White - insulation split at end. No apparent damage to wire.	Split insulation to be removed when wire is stripped	Cont. Check, J1-44 through Hg Switch.
Term 2B (42)	Red - no apparent damage.	None.	Cont. Check, J1-42
43	Orange - insulation split at end of wire and small nick 1/4 inch from end. No apparent damage to wire	Split insulation to be removed when wire is stripped	Cont. Check, J1-43
7	Yellow - no apparent damage.	None.	Cont. Check, J1-7
45	Yellow - no apparent damage.	None.	Condition of wire does not indicate a problem. Capacity check *
24	White - insulation split at end of wire. No apparent damage to wire.	Split insulation to be removed when wire is stripped	Paragraph 11.2a modified (805766 A)
26	White - no apparent damage	None	Paragraph 11.2a modified (805766 A).
25	White - insulation split at end. No apparent damage to wire.	Split insulation to be removed when wire is stripped	Paragraph 11.2a modified (805766 A)
23	Red - no apparent damage.	None	Paragraph 11.2a modified (805766 A).
39	Black - nicks and scratches in insulation approximately 1-7/8 inch from end of wire. No apparent damage to wire.	Use as-is	Paragraph 9.1 (See Assy. Record.)
38	White - no apparent damage.	None.	Paragraph 9.1 (See Assy. Record.)
30	White - insulation split approximately 5/16 inch from end of wire. No apparent damage to wire.	Sleeve with teflon at end of wire	Special Starter Timer Test (805764).
34	Black - no apparent damage.	None	Cont. Check, J1-34 through Hg Switch.
19	Red - no apparent damage.	None	Cont. Check, J1-19
22	Black - slight nick in insulation. No apparent damage to wire.	Use as-is	Paragraph 11.2a modified (805766A)
Term 2A (33)	Red - hole in insulation approximately 1-3/8 inch from end of wire. Shiny surface, apparently wire, showing. No visible damage to wire.	Sleeve with teflon tubing	Special Starter Timer Test
31	Orange - nick in insulation approximately 1 inch from end of wire. No apparent damage to wire.	Use as-is.	Special Starter Timer Test (805766)
6	Black - several nicks and scratches in insulation No apparent damage to wire	Use as-is	Cont. Check, J1-6
32	Yellow - no apparent damage.	None	Condition of wire does not indicate any problem. (Hg Switch).
2	Yellow - scratch in insulation approximately 1/16 inch long near potting. No apparent damage to wire.	Use as-is.	Cont. Check, J1-2
28	Red - hole in insulation to wire. No apparent damage to wire. (3) strands visible, approximately 3/4 inch from end of wire. Also nick in insulation.	Sleeve with teflon tubing	Cont. Check, J1-1
29	Yellow - hole in insulation to wire, approximately 3/8 inch from end of wire. Five strands of wire visible, two strands appear to have slight scrape marks. Also, nick in insulation 1/2 inch from end	Sleeve with teflon tubing	Cont. Check, J1-3
27	Black - several nicks and scratches in insulation. No strands of wire visible or apparently damaged.	Sleeve with teflon tubing	Cont. Check, J1-8
40	White - no apparent damage	None	Paragraph 9.1 (See Assy. Record.)
41	Black - no apparent damage.	None	Paragraph 9.1 (See Assy. Record.)
5	Red - no apparent damage.	None	Cont. Check, J1-5 through Setamp
4	Yellow - insulation and five strands of wire cut into approximately 1/2 inch from end of wire	Splice new wire, WE type splice, with 2 wraps on existing wire and 3 wraps on new sleeve with Tetion tubing.	Cont. Check, J1-4 through Setamp
3	Black - too short, should be removed and replaced	Remove and replace	None Required - New wire
35	Caging wire removed during disassembly operation.	Replace	New part - Acceptance tested
36	Caging wire removed during disassembly operation.	Replace	New part - Acceptance tested
37	Caging wire removed during disassembly operation	Replace	New part - Acceptance tested
Structure Web	Web cutout to remove wires between B-2 Seismo Amp and sequence timer assy.	Use as-is	
Battery Board	Normal cleaning required on terminals in battery board cavity prior to wire installation	Clean	

*NOTE:
A capacity check of two similar wires of the same general length and spacing was performed with same instrument. A capacity of 1/2 puf was measured between the wires. The test wire was then cut approximately 4 inches from the test end (equivalent to length of wire removed from epoxy) and the capacity dropped to 1 puf. Test indicates wire 45 is continuous to G Switch.

TABLE 2

SUMMARY OF SPHERE 018 WIRE REWORK

WIRE NO.	CONDITION	DISPOSITION	TEST REQUIREMENTS
2	Yellow - no apparent damage.	None	Cont. Check, 7-B1.
23	Red - no apparent damage.	None.	Paragraph 11.2a Modified (805766A).
22	Black - insulation damaged (3) places, no apparent damage to wire strands.	Remove and replace	Paragraph 11.2a Modified (805766A)
24	White - no apparent damage	None.	Paragraph 11.2a Modified (805766A).
7	Yellow - no apparent damage.	None.	Cont Check, 1-B4.
25	White - no apparent damage.	None.	Paragraph 11.2a Modified (805766A)
6	Black - several cuts in insulation. Wire visible one place only. (Damage in end 1-1/2 inch of wire).	Sleeve with teflon tubing.	Cont. Check, 1-B2
26	White - no apparent damage	None.	Paragraph 11.2a Modified (805766A).
19	Red - no apparent damage.	None	Cont. Check, 1-B5.
Term 2A (33)	Red - scratch and slight nick in insulation. No apparent damage to wire.	Use as-is.	Special Starter Timer Test (805760).
32	Yellow - no apparent damage.	None	Condition of wire does not indicate any problem (5 G Switch).
44	White - no apparent damage	None	Cont. Check, 14-44 through Hg switch.
30	White - no apparent damage.	None.	Special Starter Timer Test (805764)
39	Black - several nicks and scratches in insulation. No apparent damage to wire	Use	Paragraph 9.1
38	White - no apparent damage.	None	Paragraph 9.1
31	Orange - no apparent damage.	None.	Special Starter Timer Test (805764).
43	Orange - no apparent damage.	None.	Cont. Check, 31-2.
34	Black - slight nick in insulation approximately 1-1/2 inch from end. Insulation split at end of wire. No apparent damage to wire	Split insulation to be removed when wire is stripped Otherwise use as-is	Cont. Check, 34-44 through Hg Switch
(42) Term 2b	Red - slight cut in insulation. No apparent damage to wire.	Use as-is	Cont. Check, 43-42
45	Yellow - slight nick in insulation approximately 1 inch from number tag. No apparent damage to wire.	Use as-is	Capacity Check (43-42). Condition of wire does not indicate any problem (2 SG)
3	Black - wire had been removed	Replace	None required. New wire
4	Yellow - hole in insulation to wire approximately 3/4 inch from end. No apparent damage to wire.	Wrap with teflon tape.	Cont. Check, 4-5 through Setsmo.
5	Red - (2) nicks in insulation approximately 1-1/2 inch from end of wire. No apparent damage to wire.	Use as-is.	Cont. Check, 4-5 through Setsmo.
28	Red - slight impression or cut in insulation, approximately 1 inch from end. No apparent damage to wire.	Use as-is	Cont. Check, 28-B.
27	Black-(2) holes in insulation. One where wire enters potting 3/16 inch, one strand visible but no apparent damage. 2nd hole approximately 1/4 inch above potting, two strands visible with no apparent damage. Several nicks in insulation.	Teflon sleeve both holes.	Cont. Check, 7B-B
29	Yellow - hole in insulation to wire approximately 3/16 inch above potting. No apparent damage to wire. End of insulation split.	Sleeve with teflon tubing	Cont. Check, 8B-B
40	White - slight nick in insulation where wire enters potting. No apparent damage to wire	Use as-is.	Paragraph 9.1.
41	Black - several nicks and scratches in insulation. No apparent damage to wire	Use as-is	Paragraph 9.1
Batt.Bd Term 5	Yellow - to Term 5 of battery board. Hole in insulation to wire. No apparent damage to wire.	Cover with epoxy	Does not apply
Batt.Bd Term 10	Red - (2) strands of wire slightly scraped Adjacent to terminal	Use as-is.	None required.
Terminals	All terminals on battery board need cleaning. before replacing wires.	Clean	
Structure Web	Web between squib block and sequence timer has been cut to open connecting hole	Use as-is	
35	Wire removed during disassembly operation.	Remove and replace	
36	Wire removed during disassembly operation.	Remove and replace	
37	Wire removed during disassembly operation.	Remove and replace	
-	Resistor R-2 on squib switch assembly PP-11 broken during wiring. (RECONFIGG)	Remove and replace.	

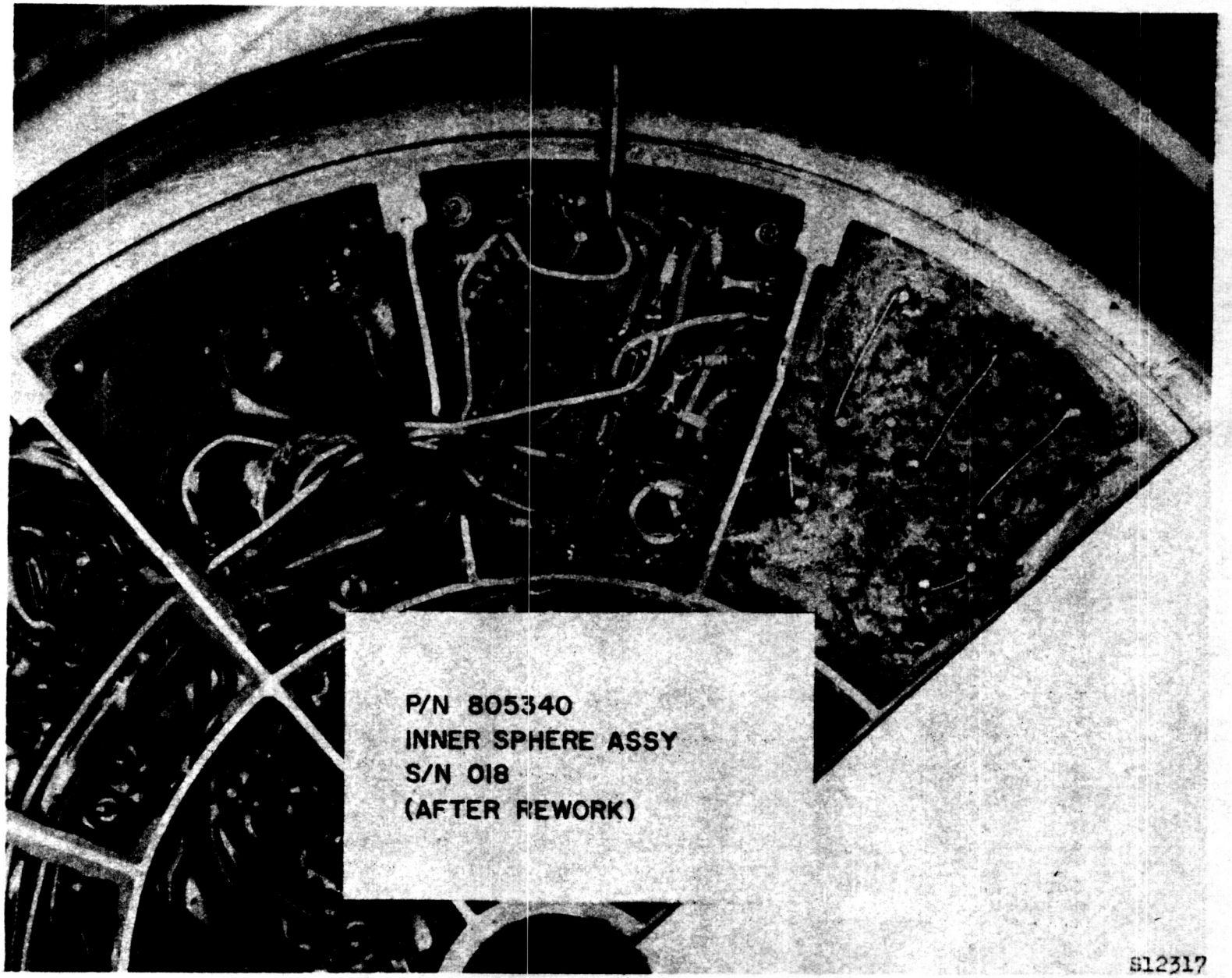

FIGURE 4. CAPSULE 018 INNER SPHERE ASSEMBLY (DURING REWORK)

b. Atlas MS 2.1-0-C Squib Switches

When the failure of the sterilized squib switches in the power and sequencing assembly occurred, it was apparent that the squib switches already installed in spheres 017 and 018 were suspect and had to be replaced. To confirm suitability of unsterilized switches from the same lot, a series of firing tests were performed. The results of these tests may be summarized as follows:

(1) Of 34 sterilized squibs that were tested, all switches failed to fire. This includes power and sequencing assembly DPT switches, those from the two squib modules removed from spheres 017 and 018, and switches especially sterilized for this test.

(2) Of 22 unsterilized switches that were tested, all switches fired in a normal manner.

It may be noted that four of the unsterilized switches had been encapsulated in a power and sequencing assembly module and were subjected to 185°F for 12 hours. This, plus the 100-percent correlation of all unsterilized switches tested, was considered adequate evidence that squib switches from this lot were satisfactory for flight use in the capsule and in the power and sequencing assembly. Additional details concerning these tests is included in the following paragraphs.

On 1 September 1962 the switch module in the power and sequencing assembly device failed to function upon command. A group of four switches from the same manufacturers and loaders lot (Atlas Chemical Lot 1161) were started on a 24-hour sterilization bake at 257°F. In addition, two more switches from this lot were started at 300°F for the same duration. Coincident with the above, one switch (S/N 148) was initiated during an attempt to disassemble it for comparison purposes. (This switch had not previously been potted, cured, or sterilized.) An additional switch (also unsterilized and uncured) was initiated in a normal manner. This switch was S/N 151.

On 2 September, after 24 hours, the switches subjected to 257 and 300°F were removed from the ovens, and two additional groups of four switches each were placed in the two temperature conditions. These remained in this environment until 8:00 a.m. on 4 September (total of 41 hours' exposure).

On 4 September an attempt was made to fire the fourteen switches subjected to the heat environments discussed above. All switches failed (see Table 3 for details). As in the original power and sequencing assembly failure, the bridge continuity was destroyed upon electrical impulse, but no mechanical action (switching function) was observed.

An engineering model power and sequencing assembly containing four squib switches which had previously been exposed to 185°F for 12 hours (required to cure the encapsulating material in the module) was then subjected to the normal firing command. All switches functioned normally.

Two additional untreated squib switches were then test-fired and worked per specification.

An attempt to evaluate possible degradation of the other explosive items in the Lunar Capsule Assembly was instituted by exposing two each of the following to 257°F for 24 hours:

C311-3	Penetrater Squib
OA-A13	Bolt Cutter
1MT114	Piston Motor

These units all fired satisfactorily after the heat cycle.

Also on 5 September 1962, a further effort to statistically support capsule rework was initiated. Ten squibs (unsterilized and unpotted) were test-fired. All units fired satisfactorily. These switches are from the same previously qualified lot as the replacement switches being installed in spheres 017 and 018. This brought to twenty-two the number of switches which have fired satisfactorily when no heat exposure in the 257°F range is involved. This yields a statistical reliability of 90 percent on a 90-percent confidence level that the next squib switch will also fire under like conditions. The fact that these switches are used in pairs and that either of the pair is capable of performing the system mission increases the reliability to 90 percent on the 90-percent condidence level, that the system function will be accomplished.

A further effort to evaluate the temperature/time degradation point of the MS 2.1-0-C switches with PD mix was also instituted on that date. In this study, piston motors with PD mix from an unqualified lot were placed in an oven at 257°F. Starting at 15 hours after initial exposure, samples of the piston motors were extracted from the oven and fired. This test sequence continued until units with 24 hours of heat exposure were fired. No failures were observed in this sample.

TABLE 3

MS 2.1-0-C SQUIB SWITCH FIRING, CHRONOLOGICAL COVERING 23 AUGUST - 6 SEPTEMBER 1962

QTY	S/N	POTTED	CURED	257°F 24 HRS.	257°F 41 HRS.	300°F 24 HRS.	300°F 41 HRS.	IN P&SA	FIRED	MIS-FIRED	DATE	DISPOSITION AND REMARKS
4	Unknown	X*	X					X	X		8-23	Engr. Model P&SA (1st)
1	Unknown	X	X	X				X		X	9-1	Four switches from P&SA DPT Model
1	16	X	X	X				X		X	9-1	
1	98	X	X	X				X		X	9-1	
1	101	X	X	X				X		X	9-1	
1	148										9-1	Fired during disassembly
1	151			X					X		9-1	Functioned normally
1	149			X						X	9-4	
1	152			X						X	9-4	Sent to Atlas Chem.
1	155			X						X	9-4	
1	156			X						X	9-4	
1	150					X				X	9-4	Sent to Atlas Chem.
1	162					X				X	9-4	
1	167						X			X	9-4	
1	175						X			X	9-4	
1	183						X			X	9-4	
1	185						X			X	9-4	
1	169				X					X	9-4	
1	186				X					X	9-4	
1	188				X					X	9-4	
1	200				X					X	9-4	
1	182								X		9-4	
1	199								X		9-4	
4	Unknown	X	X					X	X		9-4	Eng. Model P&SA (2nd)
10	**See Below								X		9-5	Engr. Eval. Firings

*"X" Denotes Condition Does Apply

**S/N 13, 42, 66, 67, 90, 93, 112, 139, 144 and 146 (10 Total)

c. Altimeter

Final acceptance tests of two flight altimeters have been completed. These altimeters were modified to incorporate the gamma-ray free TR tube in accordance with requirements established by JPL. Suitability of this TR tube substitution has been confirmed by compatibility test with the spacecraft at Pasadena.

The curves of the AGC voltage versus altimeter temperature for altimeters F4 and F5 are shown in Figures 5, 6, and 7. The temperature characteristics of altimeter F4, the prime altimeter for RA-5, are normal in all respects. Some difficulties were experienced in obtaining satisfactory AGC voltage-temperature characteristics for altimeter F5. Whereas the AGC voltage itself was normal, the output of the preconditioning circuit for telemetry coding was significantly distorted. In particular, in the lower temperature ranges the AGC voltage tended to converge, so that meaningful data could not be obtained.

Since the AGC voltage conditioning circuit is integrally potted with the altimeter power supply, it was necessary to replace the power supply in altimeter F5 with that from F3. The resulting AGC voltage versus temperature curves were satisfactory, and the altimeter was accepted as the flight backup unit.

d. Additional Flight Components

The remaining flight components for which engineering work was under way were completed prior to this reporting period. Other major items of the ancillary equipment were in stores and available to support the RA-5 flight. All necessary to support the RA-5 flight were shipped to AMR prior to 15 September 1962, to comply with the JPL schedule to spacecraft buildup.

e. Summary of Remaining Flight Hardware

Table 4 is an inventory list of major flight hardware that will be available after RA-5 launch. This list does not include all hardware available, but only the significant assemblies or major parts necessary to assemble the seismometer capsule and support a launch Parts for sphere 019 are not listed; all parts are available for sphere 019, of course, in compliance with present contractual commitments.

AV. PWR OUT +22.80 dbm (9-19-62)
TEST FIXTURE LOSS 26.7 db (DURING CALIB.)
PRF (DURING CALIB.) 542-541 pps
WARM-UP TIME 11.0 SEC. (AMBIENT TEMP.)

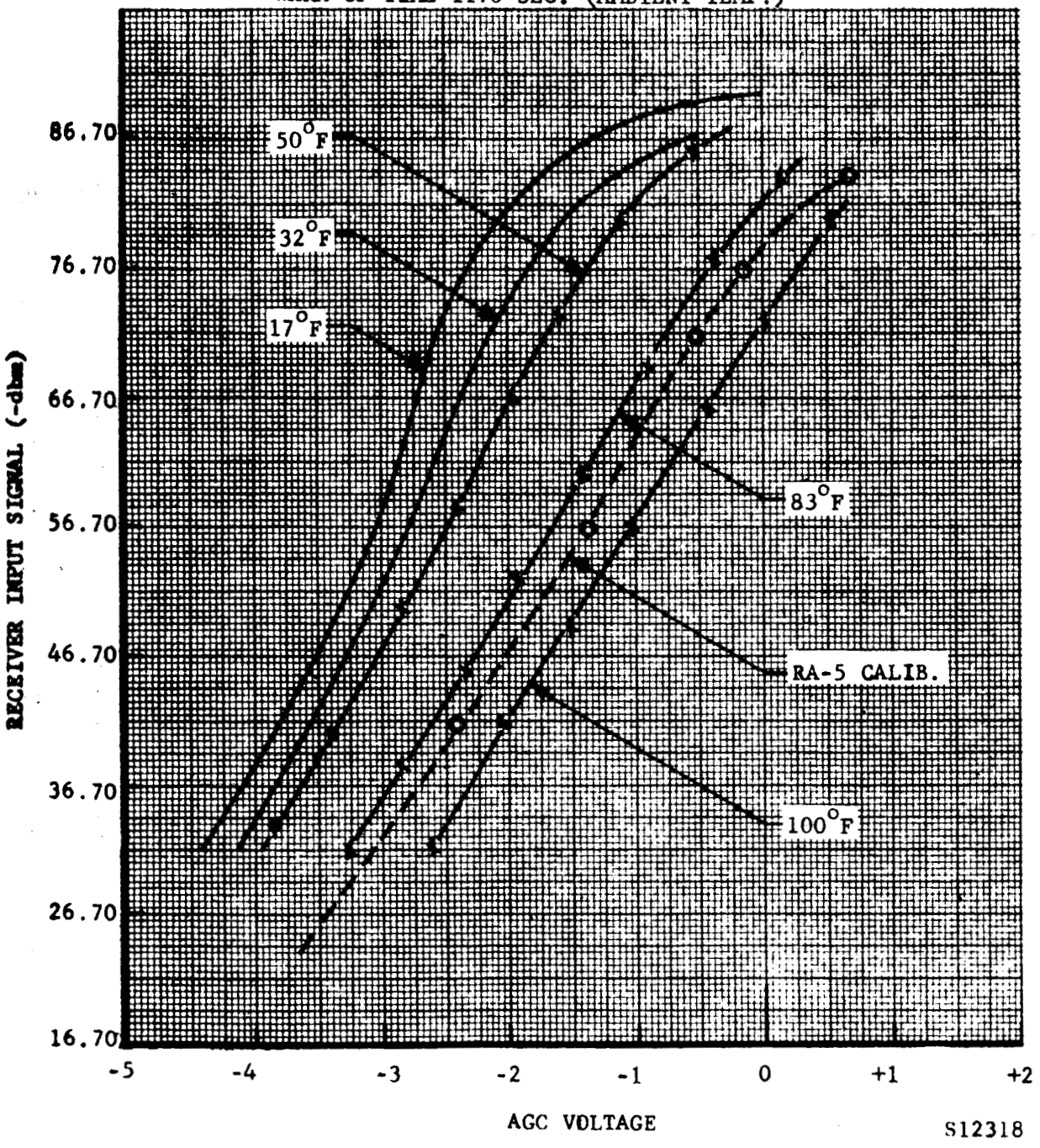

FIGURE 5. ALTIMETER F4 CALIBRATION DATA

AV. PWR. OUT 9-14-62 + 22.95 dbm
TEST FIXTURE LOSS 28.05 db (DURING CALIB.)
PRF (DURING CALIB.)562 TO 558 pps
WARM-UP TIME 14.0 @ 75°F;

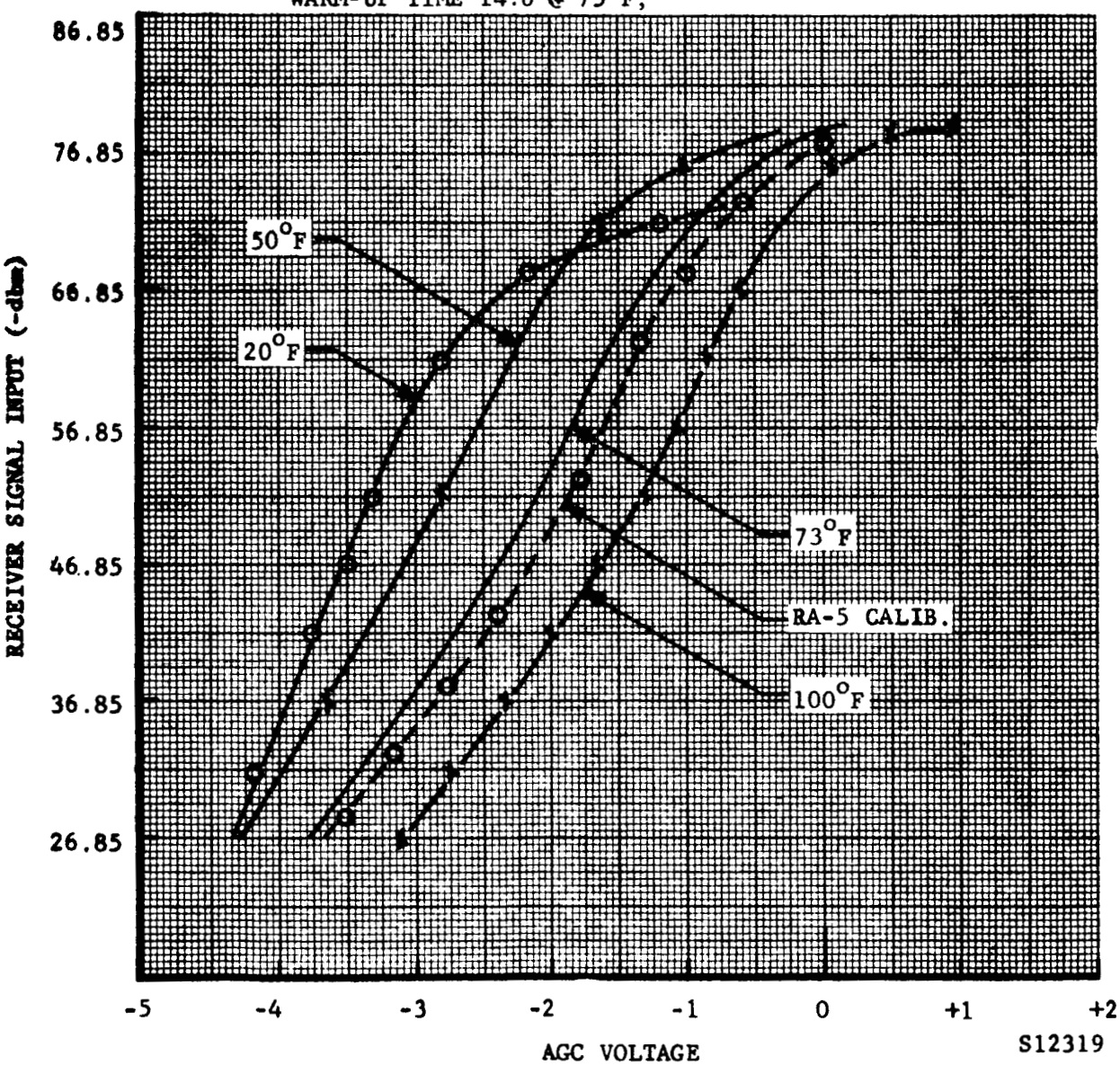

FIGURE 6. ALTIMETER F5 CALIBRATION DATA

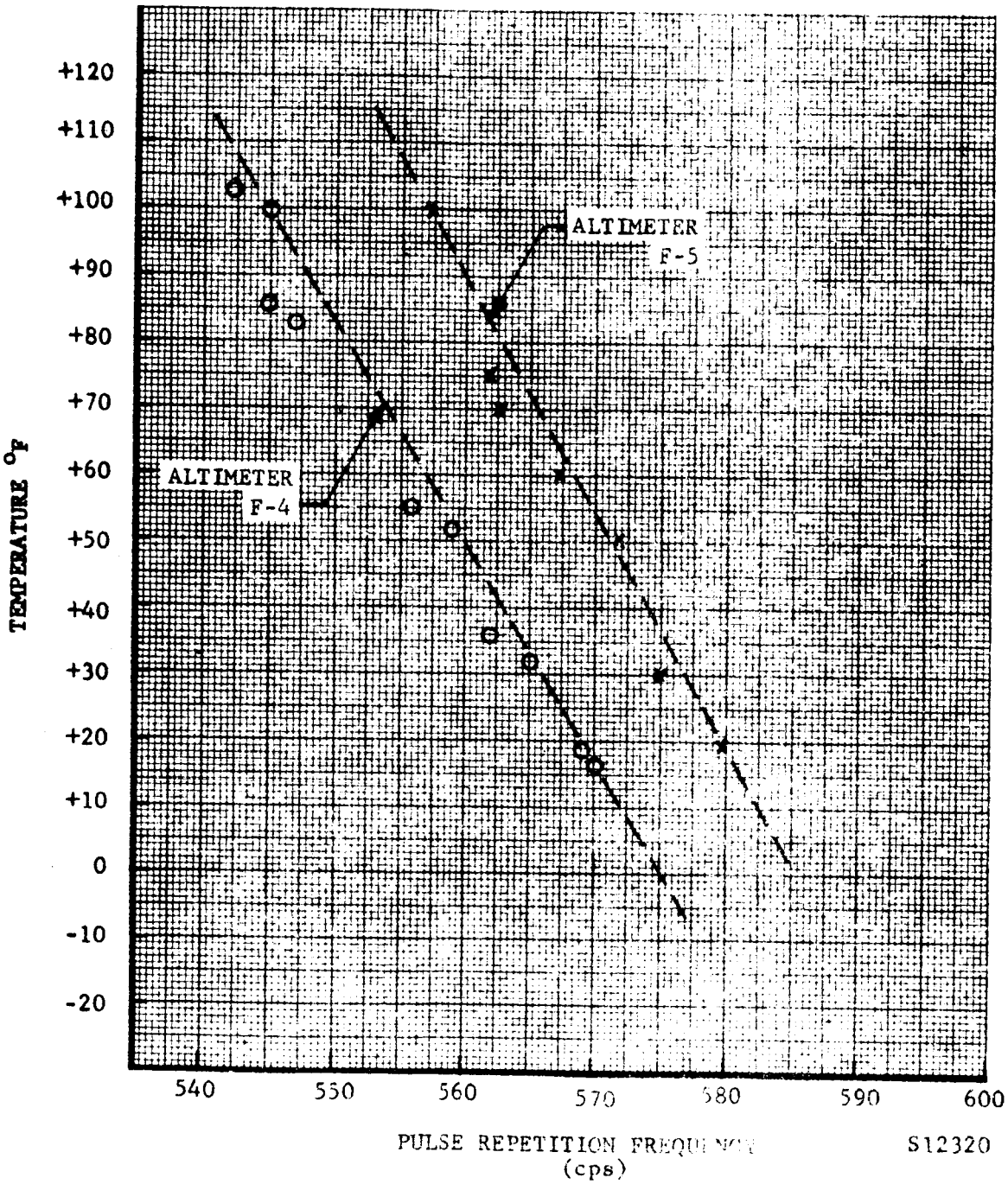

FIGURE 7. ALTIMETER PULSE REPETITION FREQUENCY VERSUS TEMPERATURE

TABLE 4

SEISMOMETER CAPSULE SYSTEM

MAJOR PARTS INVENTORY - POST RA-5
(Not Including Sphere 019)

PART NAME	DRAWING NO.	NO. OF ADDITIONAL REQUIRED: FLIGHT PARTS O/H	NO. OF ADDITIONAL REQUIRED: OTHER	REMARKS
CAPSULE				
1. Impact Limiter				
a. Rubber Cover	804046	3	0	Various thickness covers.
b. Balsa Hemispheres	804042	0	0	1
	804043	0	0	1
c. Upper Flange	804036	1	0	0
d. Lower Flange	804044	1	0	0
2. Capsule Shells				
a. Flotation Shell (sets)	800026	2	0	0
b. Insulation Shells	800025	1	0	0
3. Mechanical Parts				
a. Payload Structure, upper	805641	1	0	0
b. Payload Structure, lower	805334	2	0	0
c. Caging Assembly	800024	0	2	0 — Caging foot requires modification and retest.
d. Insulation		1	0	0
e. Pressure Valve	305577	0	2	0 — Require assembly and test.
f. Penetrators	805707	0	6	0 — Require test - from qualified lot.
4. Electrical Parts				
a. Transmitter	805630	2	1	0 — One from 017 or 018.

TABLE 4 (CONTINUED)

SEISMOMETER CAPSULE SYSTEM

MAJOR PARTS INVENTORY - POST RA-5
(Not Including Sphere 019)

	PART NAME	DRAWING NO.	FLIGHT PARTS O/H	OTHER	NO. OF ADDITIONAL REQUIRED	REMARKS
	CAPSULE					
b.	Seismometer Amplifier	5 boards	1	0	0	From Sphere 016; FP-3.
c.	Timer	805647	0	0	1	
d.	Squib Switch	805643	1	0	0	
e.	Starter Timer	805276	1	0	0	
f.	25G Switch Assembly	805348	1	0	0	
g.	Seismometer	805619	1	0	0	
h.	Battery - Payload	ESB	1	0	3	Fresh batteries for later flight.
	ANCILLARY EQUIPMENT					
1.	Retromotor	803211	1	1	0	One to be held at AEDC.
2.	Spin Motor	802100	1	0	0	Flight can safely be supported with one assembly.
3.	Motor Support Structure	800003	1	1	0	Second part requires rework of jumper contacts.

TABLE 4 (CONTINUED)

SEISMOMETER CAPSULE SYSTEM

MAJOR PARTS INVENTORY - POST RA-5
(Not Including Sphere 019)

	PART NAME	DRAWING NO.	FLIGHT PARTS O/H	OTHER	NO. OF ADDITIONAL REQUIRED	REMARKS
	ANCILLARY EQUIPMENT					
4.	Altimeter Assembly					
	a. Support Structure	801200-503	1	2	0	Require erection governor and wiring mods.
	b. Wiring Harness	801173	1	0	0	For structure above.
	c. Governor	801270	0	0	1	
	d. Altimeter	1081-E-100	1	1	0	Backup altimeter requires TR tube mod. and retest.
	e. Batteries	-	2	0	3	Fresh batteries for later flight.
5.	Radiation Shield	800120-503	1	0	1	
6.	Symmetrical Vent	800112	2	0	0	
7.	Spin Restraint	800131	1	0	0	Matched to single spin motor.
8.	P&SA	805378	1	0	1	
9.	P&SA Battery	-	2	0	3	Fresh batteries.
10.	Upper Clamp	806388	3	0	0	
11.	Lower Clamp	805961	1	0	1	
12.	Clamp Cover	800042	1	0	1	
13.	Dampers	806452	20	0	4	

It may be noted that, with the exception of the sequence timer, impact limiter balsa, and batteries, all major parts are available for assembly of sphere 020. Although backup batteries were procured in support of the RA-5 launch, it would be advisable to procure fresh stock if there were a significant time lapse before assembling an additional sphere. If the timing were proper, however, the additional batteries might not be required.

Two retromotors would be available after RA-5. The only major pieces of ancillary equipment for which backup would not be available are then the spin motor and power and sequencing assembly. The same considerations apply to the ancillary equipment batteries as for the capsule batteries.

4. FIELD OPERATIONS

a. Field Procedures

In the period between RA-4 and RA-5 a detailed review of the field procedures was made. Where major changes were required to comply with hardware changes, the procedures were modified or rewritten. In addition, many minor changes were made as found desirable during the field experience of RA-3 and RA-4. Considerable improvement in the procedures was made, particularly in more clearly defining the specific operations to be performed and in provision for specific verification by Quality Control representatives of all assembly and checkout steps

The modified procedures were released as controlled documents by the normal document release system; copies have previously been furnished to JPL.

b. Assembly and Checkout

A significant problem that had occurred with RA-3 and RA-4 concerned the radio-frequency interference between the capsule transmitter and spacecraft transponder. Subsequent to RA-4, a program was established to determine the specific causes of the interference. Unfortunately, the schedule did not permit experiments with the actual flight hardware; so, because of the elusive nature of the RFI problem, a definite system solution could not be obtained.

It had been observed that the severity of interference could be significantly changed by rotating the capsule transmitter and antenna with respect to the spacecraft transponder and antenna. By this "clocking", the degradation of the spacecraft transponder thresholder could be changed by about 15 dbm. In addition, it was observed that minimum interference usually occurred at a single angular position and that the degradation increased rapidly as the position was changed from the null point. With the damper pads installed on the retromotor and the sphere, rotation of the ball with respect to the spacecraft is limited to 30-degrees increments, with the result that selection of the optimum position might not be possible, and in fact an otherwise usable capsule might demonstrate an unsatisfactory interference level.

To eliminate this possibility, the capsules were shipped to AMR without the damper pads installed. The capsules were clocked to confirm the best angular position on the spacecraft, and then the damper pads were installed in the field at this optimum point. It may be noted that for both of the flight capsules the transponder threshold degradation was 3 db or less (above -139 db) in the shroud-off condition.

Assembly of the capsules and retromotors was essentially trouble-free. Engineering improvements that had been made between RA-3 and RA-4, improvements in the field procedures, and availability of all flight hardware prior to 15 September 1962 all contributed to this.

Installation of the power and sequencing assemblies in the cavity and of the retromotor in the capsule was considerably simplified This installation is shown in Figure 8 for one of the flight assemblies. Power and sequencing assembly mounting, wire routing, and attachment were considerably simplified by engineering changes.

Both the primary and backup capsule assemblies were completed well in advance of the required date. Both were completed prior to 1 October 1962. To further simplify the assembly, the storage fixture at AMR had been modified so that the complete capsule retromotor assembly could be completed and stored in the inverted position to shut off the capsule transmitter. With this same fixture, the assembly could be periodically rotated to confirm proper performance of the capsule electronics.

A complete report covering all operations at AMR for RA-5 is being prepared and will be published after the RA-5 flight.

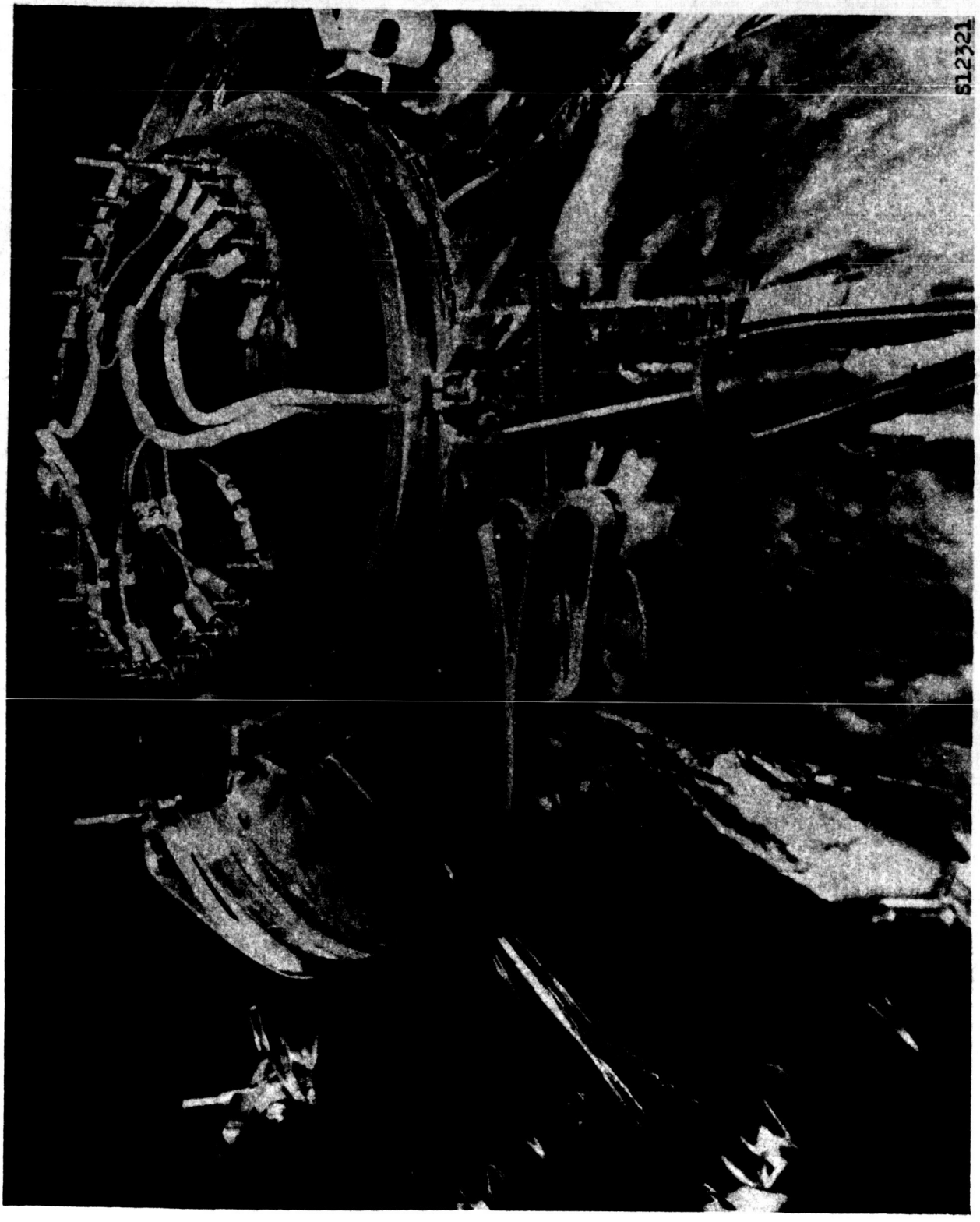

FIGURE 8. POWER AND SEQUENCING ASSEMBLY INSTALLED IN RETROMOTOR

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AERONUTRONIC DIVISION

5. ASSEMBLY SQUAWK SHEETS AND LOG OF NONCONFORMING MATERIAL REPORTS

On the following pages are the Assembly Squawk Sheets and the Nonconforming Material Reports (NMRs) that have been compiled during this reporting period.

Fabrication and testing effort is included and covers both components and buildup of the Ranger 5 flight capsules. Supplemental information regarding the NMRs is included in previous minutes of Management Review Board Meetings and is only summarized in this report.

Ford Motor Company
AERONUTRONIC DIVISION

ASSEMBLY SQUAWK SHEETS

DRAWING NO.	SERIAL NO.	DATE	WORKMANSHIP	DESIGN	OK AS-IS	REWORK	NMR
805340A	017	8-1-62	1	1	2	-	-
805340A	017	8-1-62	4	-	3	1	-
801173A	-	8-1-62	12	1	7	5	1
805348C	FP-16	8-3-62	5	-	2	3	-
805348C	FP-17	8-3-62	7	1	3	5	-
805124NC	DPT	8-3-62	3	1	4	-	-
801173A	-	8-3-62	8	-	6	2	-
805619H	011	8-3-62	3	-	1	2	-
805663G	FP-9	8-3-62	10	1	7	4	-
805664F	FP-9	8-3-62	9	-	1	8	-
805665H	FP-9	8-3-62	10	-	7	3	-
805666J	FP-9	8-4-62	8	1	2	7	-
805115NC	FP-12	8-4-62	3	-	3	-	-
805649G	FP-9	8-4-62	1	-	1	-	-
801194NC	-	8-6-62	1	-	1	-	-
805116NC	FP-12	8-6-62	1	-	1	-	-
805348C	FP-16	8-6-62	2	-	-	-	2
801194NC	-	8-7-62	5	-	3	2	-
805116NC	FP-12	8-7-62	1	-	-	-	1
805348C	FP-16-17	8-7-62	3	-	2	1	-
805340A	017	8-8-62	14	-	5	9	-
801173A	-	8-9-62	5	-	1	4	-
805348C	FP-18	8-9-62	6	-	3	3	-
805944NC	FP-11	8-9-62	6	-	4	2	-
801173A	-	8-13-62	4	-	1	3	-
805117NC	DPT	8-13-62	2	-	-	-	2

Ford Motor Company
AERONUTRONIC DIVISION

DRAWING NO.	SERIAL NO.	DATE	WORKMANSHIP	DESIGN	OK AS-IS	REWORK	NMR
805666J	FP-11	8-13-62	2	1	1	2	-
805649G	FP-10	8-14-62	6	-	2	4	-
805666J	FP-10	8-14-62	4	1	2	2	1
805666J	FP-11	8-16-62	4	1	2	3	-
805124NC	DPT-1	8-16-62	1	-	1	-	-
805124NC	FP-1	8-16-62	4	1	2	1	2
801173A	-	8-16-62	5	-	1	4	-
805664F	FP-11	8-16-62	4	-	3	1	-
805117	DPT	8-17-62	1	1	-	-	2
805124	FP-1	8-17-62	1	-	-	-	1
805649G	FP-11	8-18-62	4	-	-	4	-
805663G	FP-11	8-18-62	3	-	-	3	-
805070A	FP-6	8-18-62	4	-	2	2	-
805121	FP-1	8-20-62	1	-	1	-	-
805117NC	FP-1	8-21-62	1	-	1	-	-
805123NC	FP-2	8-21-62	-	1	1	-	-
805124NC	FP-2	8-21-62	2	-	2	-	-
805139NC	-	8-21-62	4	-	3	1	-
805279	018	8-21-62	1	2	3	-	-
805114NC	-	8-22-62	1	-	1	-	-
805114NC	FP-14	8-23-62	-	1	1	-	-
805121NC	FP-2	8-23-62	2	-	2	-	-
805123NC	DPT	8-23-62	5	2	4	2	1
805123NC	FP-2	8-23-62	1	-	1	-	-
805126A	DPT-1	8-23-62	4	2	4	2	-
805127A	DPT	8-23-62	3	2	2	2	1
805127A	DPT	8-23-62	4	-	1	3	-

RE-ORDER No. 62-374

Ford Motor Company
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DRAWING NO.	SERIAL NO.	DATE	WORKMANSHIP	DESIGN	OK AS-IS	REWORK	NMR
805139A	3	8-23-62	1	-	1	-	-
805348C	FP-19	8-23-62	5	-	4	1	-
805348C	FP-20	8-23-62	4	-	3	1	-
805139NC	DPT-2	8-24-62	4	-	3	1	-
805141B	DPT-1	8-24-62	1	-	1	-	-
805145NC	DPT	8-25-62	3	-	3	-	-
805127	FP-2	8-27-62	2	-	2	-	-
806496NC	FP-12	8-27-62	3	-	2	1	-
805121NC	FP-2	8-28-62	1	-	1	-	-
805127	FP-2	8-28-62	5	-	1	-	4
805123NC	FP-1	8-29-62	5	-	4	1	-
805123NC	FP-3	8-29-62	1	-	1	-	-
805126A	FP-2	8-29-62	4	-	2	2	-
805127A	FP-1	8-29-62	4	-	3	1	-
805340A	018	8-29-62	4	-	3	-	1
805141C	FP-1	8-31-62	1	-	1	-	-
805127NC	FP-3	9-4-62	1	-	1	-	-
805145NC	FP-1	9-4-62	1	-	1	-	-
801000F	104	9-5-62	3	1	3	-	1
801000F	105	9-5-62	6	2	3	3	2
801199NC	104	9-5-62	2	4	2	4	-
801199NC	105	9-5-62	3	4	3	4	-
805279C	018	9-6-62	31	-	23	8	-
805279C	017	9-6-62	31	-	19	12	-
805944NC	FP-11	9-6-62	4	-	2	2	-
805139A	5 and 6	9-7-62	3	-	3	-	-

RE-ORDER No. 62-374

Ford Motor Company
AERONUTRONIC DIVISION

DRAWING NO.	SERIAL NO.	DATE	WORKMANSHIP	DESIGN	OK AS-IS	REWORK	NMR
805664F	FP-11	9-7-62	3	-	2	1	-
806089C	FP-13	9-8-62	5	-	1	4	-
	TOTAL		347	32	211	146	22
	PERCENT OF TOTAL		92	8	55	39	6

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AERONUTRONIC DIVISION

NONCONFORMING MATERIAL LOG

DRAWING NO.	PART NAME	NMR NO.	NMR DATE	REASON FOR REJECTION	CORRECTIVE ACTION REQUIREMENTS
801173A	Altimeter Harness	18232	8-1-62	Wiring diagram inadequate.	Drawing to be revised.
805114	Sequence Timer Module	19651	8-2-62	Resistor lead cut at top of ribbon.	None. Operator is aware of condition.
806084	Bias Booster (FP-11)	19652	8-3-62	Potting milled flush to terminal board.	None stated on NMR.
800023	Battery (S/N 16A-B)	16468	8-6-62	Poor soldering of leads by vendor.	Source inspection required on future units.
	(S/N 18A-B)	17699	8-24-62		
805707	Penetrator Assy. (S/N 23)	18083	8-6-62	Wire broken at terminal	None. Operator is aware of condition.
805707	Penetrator Assy. (S/N 18)	18061	8-7-62	Retainer pulled loose from barrel.	None stated on NMR.
805348C	Switch Assy. (FP-16)	19653	8-7-62	Switch damaged during machining operation.	None. Operator is aware of condition.
805121NC	Welded Module Retro Release Timer.	19654	8-7-62	Nickel wire spliced to nickel ribbon.	Drawing to be revised.

RE-ORDER NO. 62-3374

NONCONFORMING MATERIAL LOG (Continued)

DRAWING NO.	PART NAME	NMR NO.	NMR DATE	REASON FOR REJECTION	CORRECTIVE ACTION REQUIREMENTS
805619H	Seismometer Assy. (S/N 11)	19655	8-7-62	-142 seal contained voids.	Unit reworked (This is an inherent condition with RTV-II.)
805116NC	Sequence Timer Assy.	19656	8-7-62	Dimensional nonconformance.	Operator aware of condition.
800147	Inertia SW 25g	19696	8-7-62	Paragraph 4.6 of Test Procedure not accomplished.	Test Procedure to be revised.
805577B	Thermal Valve (S/N 1B and 2B)	18062	8-9-62	Units baked at 500°F. Should be 257°F.	Override control installed on oven. Parts retested.
805340	Upper Structure Assy.	19526	8-9-62	Subassemblies baked at 500°F. Should be 257°F.	Parts scrapped and override control (installed) on oven.
805348C	Switch Assy. (FP-16-17)	19697	8-9-62	Parts were baked at 500°F. Should be at 257°F.	Units scrapped. Override control installed on oven.
805641E	Upper Structure	19699	8-9-62	Parts were baked at 500°F. Should be at 257°F.	Part reinspected. No damage. Override control installed on oven.
806151	VCO	18090	8-13-62	Paragraphs 3.2.5 through 3.2.5.3 of Test Procedure not accomplished because of schedule.	Performance verified by 100-HR test on three other units.

NONCONFORMING MATERIAL LOG (Continued)

DRAWING NO.	PART NAME	NMR NO.	NMR DATE	REASON FOR REJECTION	CORRECTIVE ACTION REQUIREMENTS
805116NC	Sequence Timer	19658	8-13-62	Resistor Leads clipped flush with ribbon.	Unit reworked. Operator aware of condition.
805000A	Payload Assy. (017)	18092	8-14-62	Space between upper structure and batteries not completely filled with resin.	Unit reworked and X-rayed again.
805707	Penetrator Assy.(S/N 017)	19528	8-14-62	Leak detected during vacuum fill.	No detrimental effects were anticipated.
805663G	Seismometer Amp. B-2 (FP-10)	19659	8-14-62	Blueprint does not call out location of resistors.	Drawing to be changed.
805666J	Seismometer Amp. B-4 (FP-10)	19660	8-15-62	Resistors installed on not blueprint requirements.	Drawing to be changed.
PE2043	Pulse Transformer	19531	8-16-62	Transformer broke loose during vibration.	Part returned to vendor for evaluation.
805124	Spin Timer	19661	8-16-62	Nickel wire spliced to nickel ribbon.	EO A26391 issued to allow wire to ribbon.

NONCONFORMING MATERIAL LOG (Continued)

DRAWING NO.	PART NAME	NMR NO.	NMR DATE	REASON FOR REJECTION	CORRECTIVE ACTION REQUIREMENTS
806090A	Transmitter Assy.	19534	8-17-62	VCO output voltage level erratic and noisy.	Unit scrapped. Failure report written.
805124NC	Spin Timer Assy.	19663	8-17-62	Ribbon melted and burned.	Unit designated "Not for Flight."
806690A	Transmitter (S/N 110)	19532	8-20-62	Modulation Inoex at 50 degrees within specification.	None required (see remarks on NMR).
800023	Capsule Battery (S/N 16A-B)	19540	8-21-62	Test Procedure 805888 has conflicting resistance calculation requirements.	Test Procedure to be revised.
801000F	Alt.Supp. structure (S/N 104 and 105)	19548 19549	8-21-62 8-21-62	Test Procedure requirements not accomplished.	Test Procedure to be revised.
805116	Sequence Timer	19551	8-24-62	Out of specification.	Four additional tests ran varified unit OK.
805340B	Inner Sphere Assy.(S/N 017)	19671	8-24-62	Resistor changed value.	Reworked unit. Cause unknown.

DRAWING NO.	PART NAME	NMR NO.	NMR DATE	REASON FOR REJECTION	CORRECTIVE ACTION REQUIREMENTS
805279C	Upper Sphere Assy.(S/N 017)	19672	8-25-62	Wiring not to drawing requirements.	Drawing revised per EO A26475.
806090A	Transmitter (S/N 110 and 111)	19575	8-28-62	Cover screw not installed on S/N 110. Head of screw sheared off on S/N 111.	Screw length to be changed.
805127A	Retrofire Timer (FP-1)	19579	8-28-62	At room temp. and 0°C. timer would not trigger at 10.0V. Triggered at 10.25V.	Supply voltage is expected to be 14 OV. None required.
805607	Antenna Assy. FP-9	19580	8-29-62	Connector pin broken off.	None (antenna dropped).
805340B	Inner Sphere Assy. (S/N 017 and 018)	19583	8-30-62	Counter cannot be connected to VCO per ATP 805777A paragraph 3.2.6.1.	ATP to be revised.
199-1000	Battery, P&SA (S/N 28 and 30)	19589	8-31-62	Open circuit voltage was below specification of $27.656 \pm .05$V.	Revised configuration batteries being shipped by supplier for RA-S.

NONCONFORMING MATERIAL LOG (Continued)

DRAWING NO.	PART NAME	NMR NO.	NMR DATE	REASON FOR REJECTION	CORRECTIVE ACTION REQUIREMENTS
804043J	Hemisphere Assy. Lower (S/N 017)	21413	8-31-62	804049 damper fitting not installed; weight out of tolerance; No.112 Fiberglass used instead of No.120.	EO 32650 issued to revise requirements.
804042L	Hemisphere Upper (S/N 017)	21414	8-31-62	Weight out of tolerance; 804047 wedge not installed; No.112 Fiberglass used instead of No.120.	EO 32649 issued to revise requirements.
805145NC	Power and Sequencing Assy.(DPT-1)	19588	9-1-62	Assy. did not arm with reduction of pressure.	Unbaked squib blocks to be used for all future units.
805000D	Payload Assy. (S/N 017)	19590	9-1-62	Unable to obtain proper gap between shells using 800149-1 caging foot.	EO 39840 released to provide additional sizes of caging feet.
800003	Motor Support Structure (S/N 104 and 105)	19592 19593	9-4-62 9-4-62	Resistance from pins to terminals not to requirements.	None required per NMR.

NONCONFORMING MATERIAL LOG (Continued)

DRAWING NO.	PART NAME	NMR NO.	NMR DATE	REASON FOR REJECTION	CORRECTIVE ACTION REQUIREMENTS
805348C	Switch Assy. (S/N 19 and 20)	19594	9-4-62	Drawing is inadequate for dimensional inspection.	None (parts filed to fit lower structure).
				No. 19 potting cracked after baking.	None. Unit to be encapsuled.
805000D	Payload Assy. (S/N 017 and 018)	19554 19555	9-5-62 9-5-62	Based on NMR 19588 dated 9-1-62. The squibs installed in sphere are probably defective.	Units reworked. Squibs replaced. In future surveillance firings will be conducted on all ordnance items during the period of use.
805141C	Squib Module Assy. (FP-3-4)	19595	9-5-62	Head not trimmed flush with module.	None.
804043J	Hemisphere, Lower	21410	9-6-62	Rubber shell exposed through -3 Fiberglass cover.	None.
805340D	Inner Sphere Assy. (S/N 018)	19674	9-7-62	Re-run of battery test after rework showed 6-V. section = 6.6V. Should be 7.0 V. 9-V section = 9.82 V, should be 10.5 V.	None. Test Procedure is written for battery at approximately 0 hours. Accumulated time was 65 hours.

NONCONFORMING MATERIAL LOG (Continued)

DRAWING NO.	PART NAME	NMR NO.	NMR DATE	REASON FOR REJECTION	CORRECTIVE ACTION REQUIREMENTS
805340D	Inner Sphere Assy. (S/N 017)	19675	9-8-62	Time interval check of sequence timer during rework was T_1 =680 sec. Should be 720 to 1080; T_2= 73[illegible] sec. Should be 768 to 1152.	None. Error is not detrimental to operation
805043J	Hemisphere Lower (S/N 018)	21411	9-9-62	Gash in Balsa hemisphere.	None.
805134	Battery Clamp P and SA	19676	9-11-62	Wrong terminals used.	None.
806090NC	Transmitter Assy. (S/N 112)	19677	9-12-62	Transistor collector lead open.	Unit reworked.
805123	P and SA Retro Release Timer (FP-3)	19611	9-13-62	Module failed to meet specifications.	Unit scrapped. Module to be analyzed.
805116	Sequence Timer (FP-14)	19616	9-18-62	Epocast 169 potting compound boiled up around ledges of upper board.	Process to be revised to require 8-12 hour cure of potting prior to baking.

NONCONFORMING MATERIAL LOG (Continued)

DRAWING NO.	PART NAME	NMR NO.	NMR DATE	REASON FOR REJECTION	CORRECTIVE ACTION REQUIREMENTS
800033B	Coaxial Cable (S/N 14, 15, 16 and 17)	19622	9-20-62	Attenuation is 0.36 db. Should be <0.30 db.	Specification to be re-examined.
800116B	Release Assy. (S/N 4, 6 and 7)	19625	9-21-62	Dimensional error.	DCR 01953 issued to provide a more uniform means of fabrication and test.